

A New Method for the Separation of Actinide Elements from Soils and Sediments

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Significant technological developments in the resins used for preconcentrating radionuclides have occurred over the last few years. These developments may eventually make the current laborious separation techniques obsolete. Eichrom Industries, Inc. has recently developed a new resin which exhibits an extremely high affinity for actinide elements even in the presence of macro concentrations of many commonly occurring soil constituents (Fig. 1). The Actinide Resin may be used for preconcentrating actinides from a variety of matrices.

Ashed and digested soil and sediment samples, certified for radionuclides of interest, were loaded onto a column of Actinide resin. The actinides and interfering matrices are separated using this column. Matrix constituents pass through the column, leaving only the actinides and associated elements concentrated on the resin. The actinides and extractant are then stripped from the column and fused. This "clean" sample can then be separated using other chromatographic resins, without problems from the initial sample matrix (Fig. 2). Through the use of natural matrix standards and multiple isotopic tracers each step of the procedure may be monitored independently (Fig. 3). This presentation will focus on the developments of this procedure and its effectiveness in preparing clean sources for the determination of actinides from various matrices.

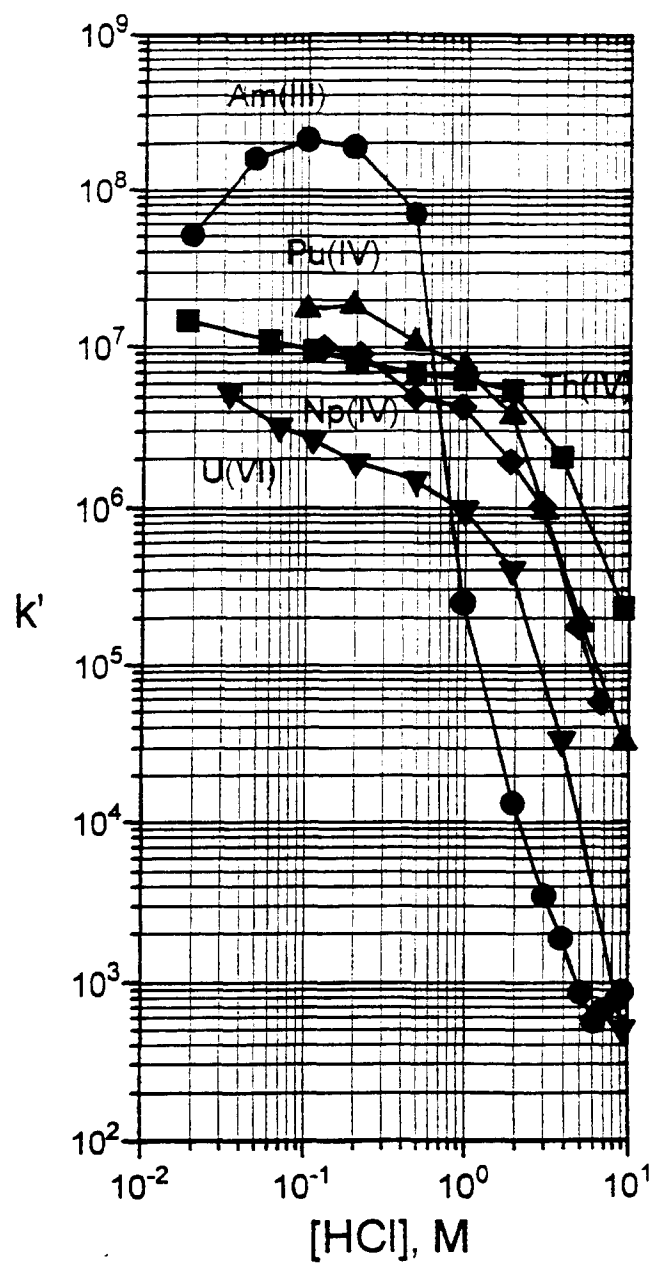


Figure 1: Actinide resin, based on diphosphonate chemistry, shows extraordinarily high affinities for actinides (III, IV, V) even in the presence of potentially interfering ions.

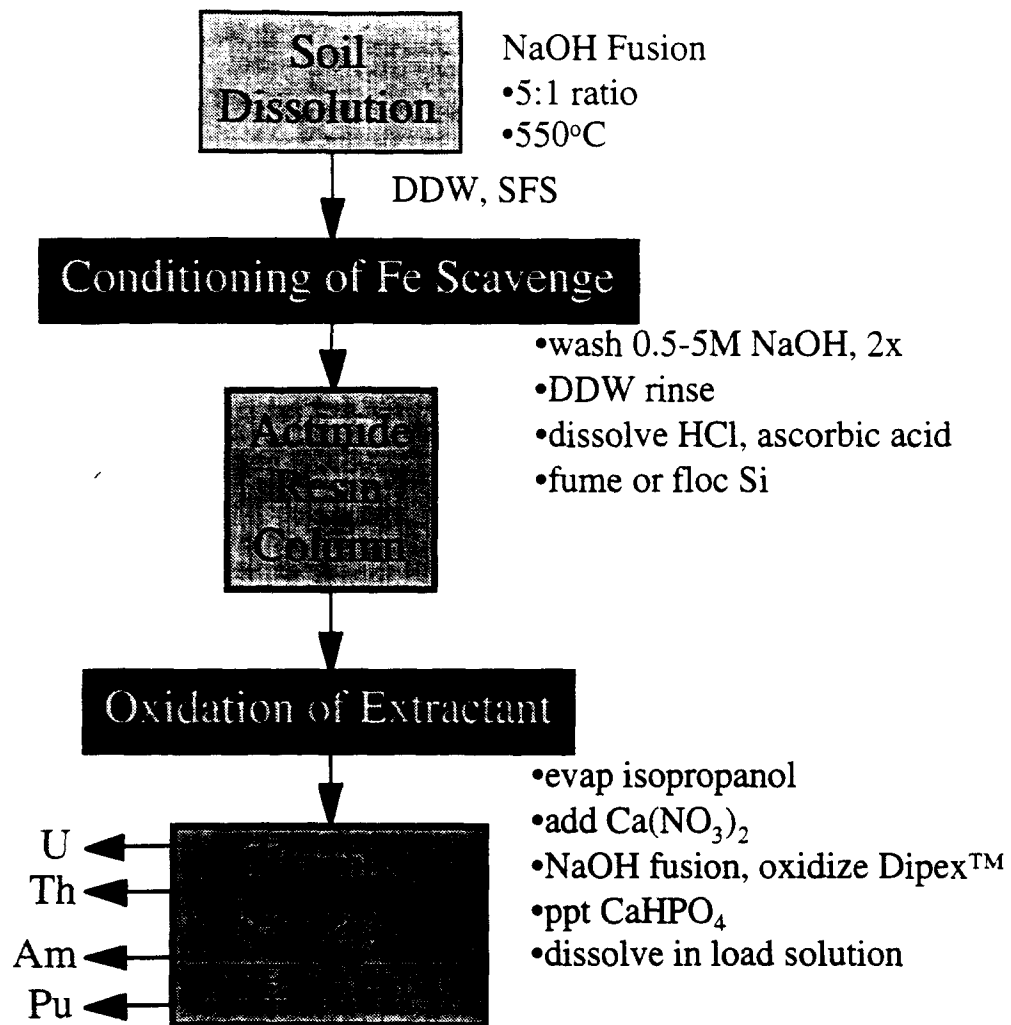


Figure 2: The general approach to this procedure includes an initial fusion and digestion of the sample followed by the Actinide Resin column to concentrate the actinides. The extractant along with the actinides are stripped from the column and fused. The sample is now in a common form and ready for an actinide separation procedure.

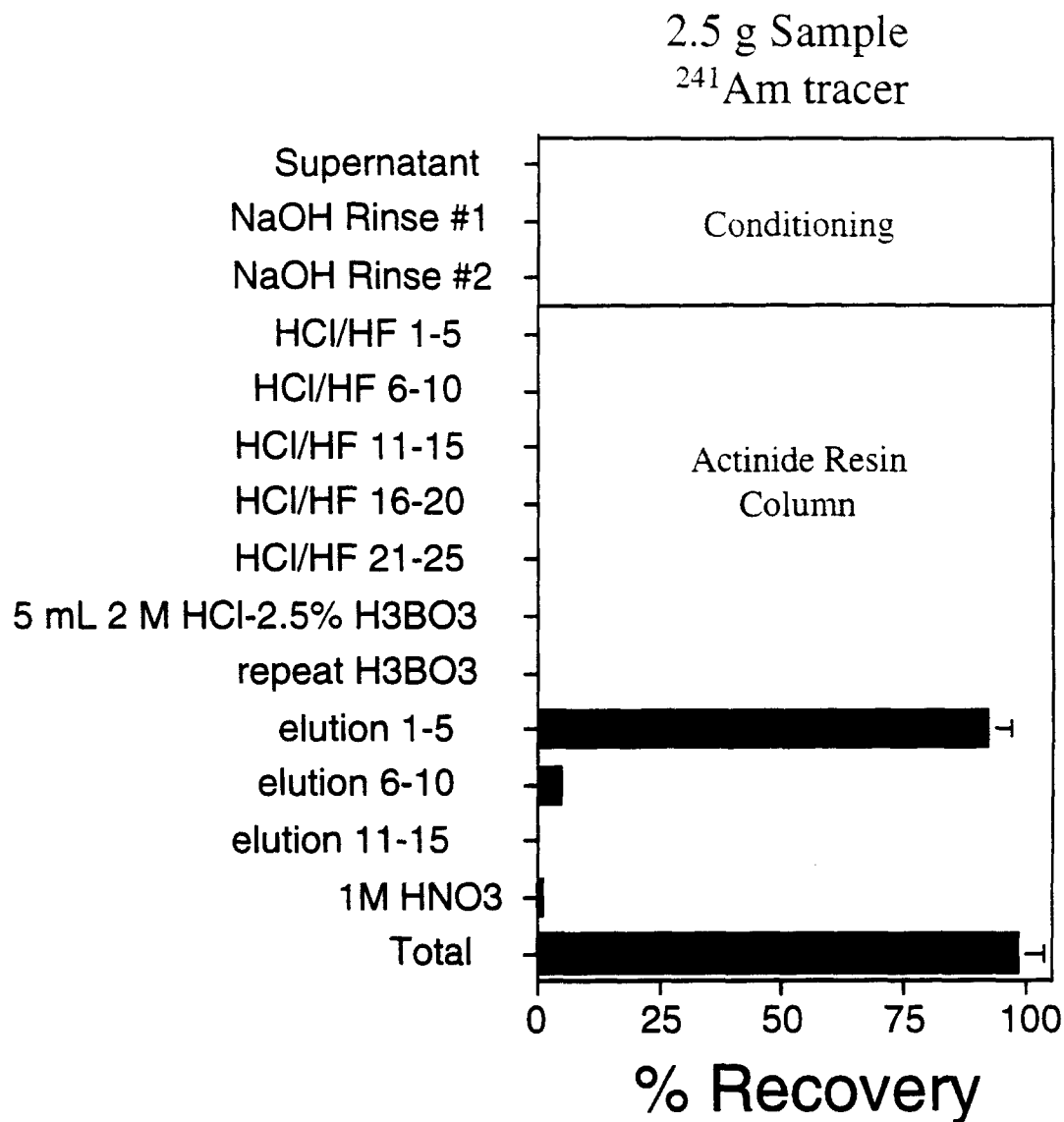


Figure 3: Distribution of Am-241 through the Actinide Resin column procedure. The total represents the sum of the individual steps. There was no loss of the tracer through the Actinide Resin column.